SPR™ EX

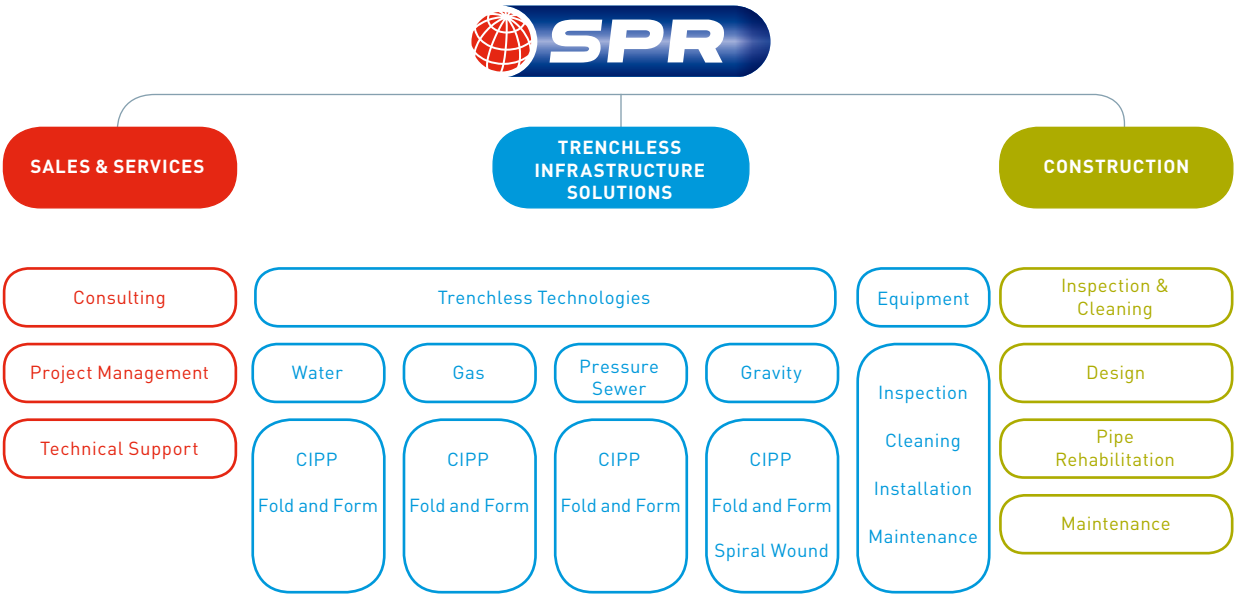
STRUCTURAL, LIGHT WEIGHT, CLOSE FIT LINER FOR GRAVITY PIPELINES FROM 150 mm TO 1050 mm

FORMING GLOBAL CONNECTIONS

SEKISUI SPR´S TECHNOLOGIES AND SERVICES

SEKISUI SPR Group is synonymous with superior solutions for underground infrastructure worldwide.

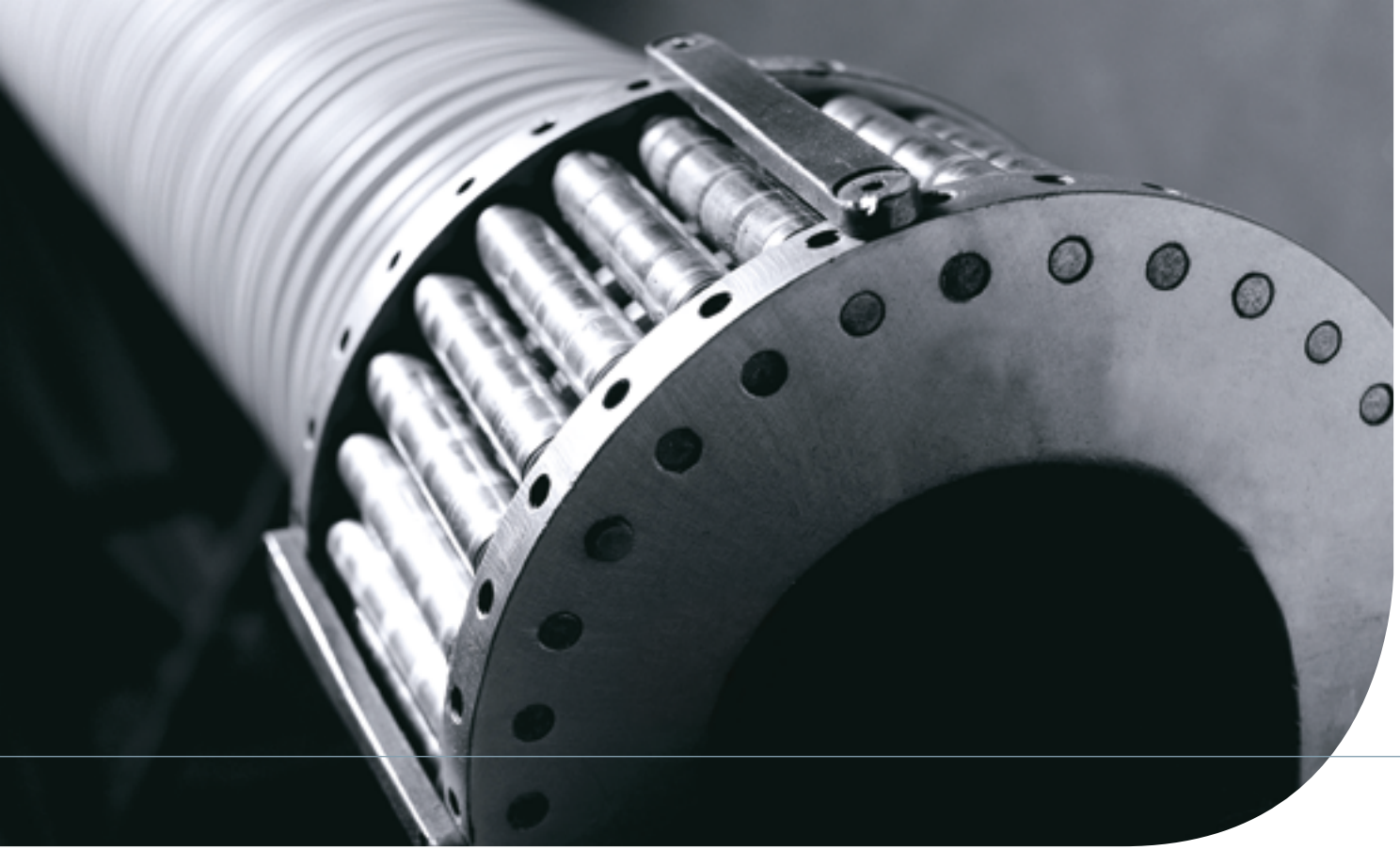
SEKISUI SPR offers outstanding and environmentally sustainable technologies and construction services for water supply and drainage through its global sales network.



SEKISUI SPR's innovative, patented, and world renowned spiral wound technologies are used the world over for the time and cost efficient means they offer for rehabilitating damaged pipes with minimum impact on the environment.

The spiral wound technologies for gravity are based on the principle of winding a continuous plastic strip into a liner directly into the deteriorated pipe. The plastic strip is spirally wound via a patented winding machine positioned in the base of an existing manhole or access chamber. The edges of the strip interlock as it is spirally wound to form a continuous watertight liner inside the host pipe.
For the spiral wound rehabilitation of gravity pipes SEKISUI SPR offers five technology systems:

	SPR™	SPR™ PE	SPR™ EX	SPR™ ST	SPR™ RO
Diameter	800 – 5500 mm 32 – 217 in.	900 – 3000 mm 36 – 120 in.	150 – 1050 mm 6 – 42 in.	450 – 2500 mm 18 – 99 in.	800 – 1800 mm 32 – 72 in.
Material	PVC	HDPE	PVC	PVC	PVC
Shape	circular, non-circular, custom shape	circular	circular	circular	circular
Installation	fixed diameter	fixed diameter	close fit	fixed diameter	close fit



STRUCTURAL, LIGHT WEIGHT, CLOSE FIT LINER FOR GRAVITY PIPELINES

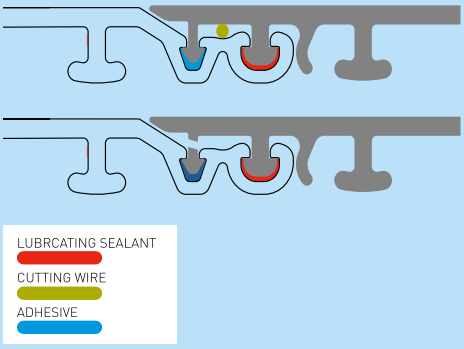
The SPR™ EX lining system is a unique process for restoring the efficiency, reliability and structural integrity of aging sewers, stormdrains and culverts.

SPR™ EX liners can structurally rehabilitate brick, concrete, glass reinforced plastic or corrugated metal sewer and stormwater pipelines with diameters from 150 mm to 1050 mm.

The plastic profile that forms the liner is provided in a range of sizes and thicknesses. The appropriate profile is selected to provide a liner with sufficient stiffness to meet the design requirements for the project.

Project experience
SPR™ EX has been used to rehabilitate sewers and stormwater lines around the world. It has proven capable of providing a structural liner for severely deteriorated pipelines, and has been installed under difficult site conditions with minimal community disruption.

PVC Profiles and Sealant Materials



Cross-section of a typical profile, showing the mechanism that locks together successive wraps of profile

A smooth winding and expanding process
The pipeline is first cleared of debris and obstructions, cleaned and inspected. Locations of lateral connections or branch lines are logged. The SPR™ EX winding machine is lowered to the base of the access chamber through a standard opening. The PVC profile is fed through into the machine from an above ground spool. The SPR™ EX profile is wound in at a diameter smaller than the host pipe. The liner is held together at the smaller diameter by the secondary lock.

Winding is stopped when the wound pipe reaches the upstream access chamber. The end of SPR™ EX liner is then torsionally restrained. Expansion of the liner commences by pulling the cutting wire, severing the secondary lock.

As the wire is progressively removed, more profile is wound into the line. The lubricating sealant in the primary lock allows adjacent profile wraps to slide relative to each other. In response to the additional profile, the liner expands in diameter to fit tightly against the inside wall of the deteriorated pipe. The process continues until the liner has been expanded for the full length of the deteriorated pipeline between access chambers. Then the lining is complete.

The ends of the liner at both access chambers are sealed and rendered to make them smooth with the host pipe. Lateral connections can be immediately reinstated by robotic cutting. The connection between the main pipe and the lateral can then be sealed.

MINIMAL LOSS OF DIAMETER, IMPROVED FLOW

Flow advantages
- Installed to fit tightly against the existing pipe wall – minimum loss of cross sectional area
- Flow efficient, smooth bore with circular cross section
- Usually greater hydraulic capacity than the host pipe
- No ripples or wrinkles even when host pipe joints are offset
- Winds smoothly around large radius pipeline bends

A strong flexible liner
- Can be designed as a structural liner, a range of PVC profiles are available to meet design requirements
- Lines even the worst pipes – including those with missing inverts, obverts or other structural defects
- Structurally efficient circular cross section – even when the host pipe is misaligned
- Constant wall thickness even when negotiating voids in the host pipe
- No heating, stress cracking, shrinkage or stretching
- Machine installed, liner installation does not depend on the standard of workmanship in difficult conditions

Fast installation with minimum community disruption
- Rapid set up
- Uses existing access chambers, no need to excavate launch pits
- No on-site pipe storage required
- Small support vehicles – less disruption of traffic
- Safe work sites
- Can operate with some flow in the existing pipe
- Installation possible from difficult to reach access chambers – support vehicles and equipment

Quality control during the profile extrusion process

Products tested in accordance with global standards

The benefits of SPR™ EX at a glance

- Structural liner, strong and lightweight
- Close fit with the host pipe
- Diameters from 150 mm to 1050 mm using only five profile types
- Manufactured from pipe grade PVC
- Suitable for gravity flow sanitary sewer and stormwater pipelines
- WRc Approved™ (PT/305/0710)

Proven pipe material

- Made from similar grade of PVC as new sewer and drainage pipe
- Cell Classification of 13354 in accordance with ASTM D 1784
- Profile sealing materials are tested to confirm suitability in high ambient temperature sewer environments
- Consistent material properties – the pipe strength does not rely in curing in uncertain conditions

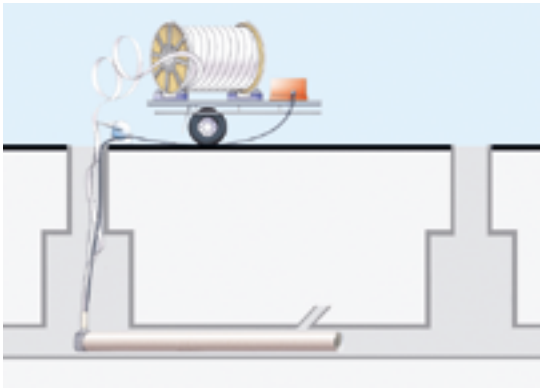
Design

Numerous industry specifications provide design methods applicable to SPR™ EX, including:

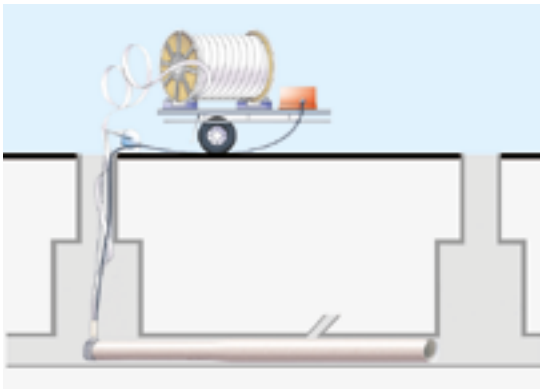
- ASTM F 1741: "Standard Practice for Installation of Machine Spiral Wound PVC Liner Pipe for Rehabilitation of Existing Sewers and Conduit"
- Australian Water Authority Specifications, usually based on Australian Standard AS 2566.1: "Buried Flexible Pipelines, Part 1: Structural Design"

Section Properties of Typical SPR™ EX Profiles

PROFILE	NOMINAL HEIGHT	TYPICAL PIPE DIAMETER	
56-7EX	7	150 - 200	mm
85-7EX	7	200 - 300	mm
85-8EX	8	200 - 375	mm
126-13EX	13	375 - 600	mm
126-15EX	15	375 - 600	mm
126-20EX	20	450 – 750	mm
126-30EX	30	600 - 1050	mm



The wind in process



The expansion process

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